PROBLEMS & SOLUTIONS… *LOCKOUT / TAGOUT*

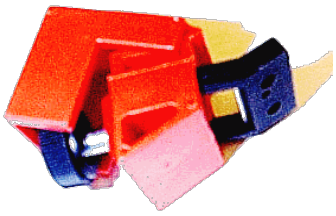

Figure 1 - 277V/480V breaker lockout device

Most people realize the importance of locking out electrical energy sources when there is work to be done. However, it is sometimes necessary to lock out other forms of energy as well - a detail that sometimes gets overlooked. For example, a 5000 psi high-pressure tank blew apart in Houston, Texas during maintenance in January 1997, killing eight and injuring two of a ten-person crew. Two shifts of workers were involved in the operation, and the second crew assumed the pressure had been released from the tank before the first crew left. To quote one of the survivors, "We just assumed [the pressure] was all let out. We'd just been doing it so long we just overlooked it!". In another incident one employee was killed and thirteen others were injured at the Idaho Engineering and Environmental Laboratory in July 1998 due to the release of a carbon dioxide fire suppression system in the building where they were performing preventive maintenance work. It was determined that the CO_2 cylinders were not locked out before work began.

Many factors contributed to these accidents. A key component is that many employees who engage in lockout/tagout (LOTO) forget to ***VERIFY*** that the equipment/system is completely de-energized. This is done by trying to start the equipment/system or by using test instrumentation. The electrical flashover accident that occurred at Fermilab in October 1997 resulted from subcontractor employees failing to verify that a motor control center had actually been de-energized. This error could easily have cost them their lives.

LOTO accidents are often caused by employees failing to **VERIFY** that equipment is completely de-energized.

Fermilab ES&H Manual chapter 5120 describes the Laboratory's program for controlling hazardous energy sources. There are six simple steps that will ensure the safety of those engaged in maintenance or installation operations:

- Prepare to perform the work.
- Notify those affected.
- Shut down the system.
- Isolate the energy source.
- Lock out the energy source and place a tag on the lock to inform others.
- Verify that the energy is locked out by trying the activate to system and by using test instrumentation.

You must also make certain that you are using the correct lockout device for the job. A recent incident at the Laboratory illustrates this point. A lockout device with its tag still attached was found to have fallen off of a circuit breaker to the floor. (See figure 1). Investigation revealed that the 277V circuit breaker was not flat on top but curved. In such instances, the breaker lockout must be used with a "cleat" to prevent it from loosening and falling off.

A cleat had not been used and none were readily available onsite. The Laboratory stockroom has since added them to their inventory. When using any lockout device, make sure it is installed properly. In the case of circuit breaker lockouts, they must be adequately "tightened."

The stockroom also has an assortment of the most common lockout devices used around the Lab. If you cannot locate a device that matches your specific application, please feel free to contact Rafael Coll at X8518 for advice. Refer to Chapter 5120 of the Fermilab ES&H Manual in order to better understand the details of the Lab's LOTO program. In many operations at Fermilab, LOTO procedures can be critical in the prevention of serious injuries up to and including fatalities.

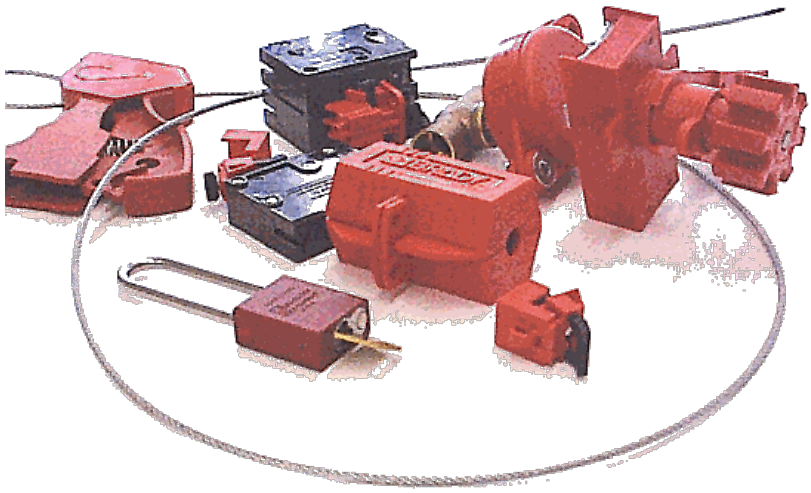

Figure 2 - Assorted devices used in LOTO.

This message should be distributed to all employees via delivery of un-addressed copies to Fermilab mail stations.